

SEAllevel™ SYSTEM FOR MONITORING FLUID LEVELS IN WASTE TANKS

TECHNOLOGY NEED

The purpose of this research effort is to develop, test, and deploy a prototype sensor for monitoring suspended solids in DOE high-level radioactive waste tanks. The specific target application is to monitor the vertical profile of suspended solids concentration in waste processing tanks at the Savannah River Site (SRS) Extended Sludge Processing (ESP) facility. The primary design goal of the measurement system is to quantitatively determine the waste stratification layer where the total suspended solids (TSS) level is below 0.1 percent by weight.

This measurement capability is needed to allow operators to determine when and where the supernatant has reached the 0.1 weight-percent suspended solids concentration level. This information will be used to guide the process of decanting liquid from the tanks. The specific need statements that address this issue are:

- SR-2031 - Develop Techniques to Increase DWPF Throughput and Productivity
- SR-2044 - *In Situ* Methods for Characterization of Tank Waste

Other site technology needs statements that are applicable include:

- OH-F0007 Feed Slurry Rheology/Hydraulic Study
- RL-WT020 Service Integrity Testing of High-Level Waste Tanks and Piping
- RL-WT026 Tank Leak Detection Systems for Underground Single-Shell Waste Storage Tanks

TECHNOLOGY DESCRIPTION

The SEAllevel™ monitoring system consists of a deployment system and a sensor and electronics package for determining the profile of weight-percent suspended solids as a function of depth into tank wastes. The system will be used to monitor the changing vertical TSS profile to allow accurate positioning of a suction nozzle for supernatant removal. The deployment system will effectively isolate the wetted components of the measurement system from the operator and the environment outside of the tank, while providing a means of introducing standard solids suspensions to be used for periodic calibration of the system.

The anticipated measurement approach will incorporate two types of detection technologies. First, optical TSS measurement approaches will be explored for commercially available instruments that are highly accurate below a few weight-percent TSS. However, customization of the instruments is likely to be necessary for producing a field-ready system capable of surviving the harsh environment of radioactive waste tanks. Second, an ultrasonic approach for monitoring total suspended solids will be explored where both commercially available systems and methods being developed by Argonne National Laboratory (ANL) will be investigated. Ultrasonic measurements are accurate for measuring TSS levels in the range of 1% to 10%. Both optical and acoustic types of monitoring approaches will be evaluated to determine if the range of TSS concentrations anticipated at the Savannah River Site (SRS) electrostatic precipitator (ESP) facility can be accurately measured.

BENEFITS

The baseline alternative to the technology being developed is to simply wait a conservative amount of time so that suspended solids can sufficiently settle before the supernatant is decanted. It is believed that sufficient settling occurs in approximately one week. However, since no suspended solids measuring techniques are available, a 40-day settling period is used to ensure that the weight-percent of suspended solids is below 0.1 percent. Another baseline alternative that is used is to lower a single use sensor into the tank waste that provides only qualitative information on the TSS profile. With an accurate measure of the suspended solids concentration profile provided by the SEAllevel™ system, waste processing

operators at SRS will be able to make better informed decisions as to when and at what level to begin the decant process.

COLLABORATION/TECHNOLOGY TRANSFER

Science and Engineering Associates, Inc., (SEA) has developed multiple environmental technologies that have been incorporated into an environmental services business sector of the company. SEA has commercial sales of products and services at multiple national laboratories and commercial sites. Upon successful completion of the development and implementation of the SEAlvel™ system, the technology will be incorporated into SEA's commercial services business.

ACCOMPLISHMENTS

The technical specifications required of the monitoring system for applications at SRS have been established through meetings at the site. The system detection levels and performance specifications were established along with the ambient conditions in which the sensor will have to operate. The preliminary design of the system has been established.

TECHNICAL TASK PLAN (TTP) INFORMATION

TTP No./Title: FT06C261 - SEAlvel™ Monitoring System for Waste Processing Tanks

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